

Remarks

Claims 1-70 remain in the application and new claims 81 and 82 have been added.

Claims 1, 31 and 61 have been added to describe the screen as having a low flow rate center portion and one or more high flow rate portions, the high flow rate portion(s) being adjacent to the center portion and one or more walls of the bushing and further amended to describe the adjusting of the hole area per unit screen area above each cell such that the hole area per unit screen area in the high flow rate portions(s) of the screen is greater than the hole area per unit screen area in the low flow rate center portion of the screen, in place of merely to be different in some screen areas than in other screen areas, basis to be found in the specification in Figures 6-14 and the description thereof, particularly including the paragraph spanning pages 13 and 14 and through line 18 of page 17 and the descriptions of Figures 9-14 on pages 22-31.

Claims 2, 32 and 62 have been amended to change "being" to "is", an editorial change. Claims 4, 6, 9, 12 and 22 have been amended to change the dependency to new claim 81 and claim 22 also to add a center portion of the screen. Claims 12, 14, 16, 19, 22, 26 and 29 have been amended to clarify that the description in the claim pertains to the second screen, basis found in the specification at page 6, first partial paragraph (lines 6-8) and last partial paragraph (lines 25-28), page 18, lines 12-21 and previous claim 2.

Claims 21-30 have been amended to more particularly describe the screen and to be compatible with amended claim 1, basis found in the specification in the last sentences of the paragraphs beginning on page 14, line 18 and paragraph spanning pages 14 and 15. Claims 51-60 have been amended in the same manner.

Claims 34, 36, 39, 42 and 52 have been amended to change the dependency to new claim 82 and claim 59 also to add a center portion of the screen. Claims 42, 44, 46, 49, 52, 54, 56 and 59 have been amended to clarify that the description in the claim pertains to the second screen, basis found in the specification at page 6, first and last partial paragraphs (see above), page 18, lines 12-21, and previous claim 32.

Claim 63 has been amended to change "at least 4030 tips" to "4000 or more tips", basis found in the last paragraph of page 1 incorporating the disclosure of U. S. Pat. No. 6,453,702 into the disclosure of the present application, the current specification at page 24, lines 12-13, U.S. 6,453,702 at col. 2, lines 37-39, col. 6, lines 35-40 and Examples 1 and 2 in the present specification showing 4798 tips.

New claim 81 combines previous claims 1 and 2, and new claim 82 combines previous claims 31 and 32.

The invention of the present claims is a bushing for receiving a molten material and a bushing and method of using the bushing for fiberizing the molten material, such as molten glass, the bushing comprising at least two opposed sidewalls and at least two opposed end walls, a tip plate having at at least 1600 orifices with at least 1600 hollow tips, often 4000 or more tips, extending from a lower surface of the tip plate and arranged in double rows, the tip plate being attached to the sidewalls and end walls, the bushing having a boxlike shape having at least four interior corners, a screen having a low flow rate center portion and one or more high flow rate portions, the high flow rate portion(s) being adjacent to the center portion and one or more walls of the bushing, the bushing also having an interior support structure comprising a plurality of internal supports welded to a top surface of the tip plate for supporting the tip plate, at least some of the internal

supports being attached to one or more of the end walls and at least some of the internal supports being attached to one or more of the sidewalls; and the bushing also having linear external supports contacting the bottom of the tip plate, the support structure forming at least 16 cells located between the bottom of a screen resting on, or mounted very near the top of, the top of the interior support structure. The interior support structure comprises a plurality of intersecting or crossing internal supports with angles between the intersecting supports at each intersection, the internal support structure, in cooperation with the at least one sidewall and the at least one end wall. The screen has a plurality of screen areas containing holes through the screen with a screen area above each of the at least 24 cells formed by the internal support structure adjusted such that the hole area per unit screen area in the high flow rate portions(s) of the screen is greater than the hole area per unit screen area in the low flow rate center portion of the screen. Key features of the invention include the screen having a low flow rate center portion with a higher flow rate portion, or portions, adjacent the center portion, the presence of a relatively large number of separate cells beneath the screen and locating the screen of the invention in the bushing such that the bottom of the screen is resting on the top of the support structure, or mounted so close to the top of the support structure that the distance therebetween is less than that at which lateral flow of molten glass from one cell to one or more adjacent cells becomes significant to maintaining optimization of tip plate temperature profile, or is resting on the top of a second, conventional screen that is resting on the top of the support structure. In other embodiments of the invention a second screen lies on top of a first screen, the hole size and density in the second screen being such that the hole area of the second screen is less than the hole area of the first screen. The bushings of the invention advance the art by providing much better control and uniformity of temperature of the molten glass at the tip plate using these key features than had heretofore been possible using the bushings and teachings of the prior art which did not reflect any concern for lateral flow of molten glass beneath the screen.

Claims 2, 32, and 62 and 63 stand rejected under 35USC112, first paragraph, as failing to comply with the written description requirement, the Examiner urging that the specification does not contain basis for "a second screen lying on top of a first screen that is the inventive screen." Claims 2, 32, and 62 have been amended to change "laying on the top" to "laying on top" (claims 2 and 32 only) and to further clarify the first and second screens. The screen in claim 1, the first screen, is a screen having a hole area in some areas of the screen that differs from the hole areas in other areas of the screen, and the second screen can be similar, but differs in that the hole area per unit area of the second screen is less than the hole area per unit area of the first screen. There is ample basis for this in the specification where some reasons for doing this include converting a bushing designed to operate in a non-channel position to a bushing suitable for a channel position, page 6, lines 11 – 30, and converting a bushing designed to make larger diameter fibers to a bushing designed to make smaller diameter fibers, see page 18, lines 8-21.

Claim 63 stands rejected under 35USC 112, first paragraph, as lacking description because of the term "at least" preceding 4030 tips. This has been changed to "4000 or more tips" by the above amendment. Claim 1 includes the phrase "at least 1600 tips" showing that the invention is not limited to the upper number of tips, except within a reasonable meaning of this phrase, and one of ordinary skill in the bushing art would consider the term to include bushings having 6000 or more tips because such bushings were and are reasonable. U.S. Patent Nos. 6,196,029 and 6,453,702, incorporated into the specification by reference, see page 1, lines 22-24, page 12, line 18, and page 21, lines 2-3, have basis for "4000 or more tips", see 6,196,029. col. 4, lines 24-25 and 6,453,702, col. 2, lines 37-39 and col. 6, lines 35-40.

For these reasons applicants believe the present claims are patentable under 35 USC 112, first paragraph, and respectfully request the Examiner to withdraw this rejection and to allow all of the claims.

All the claims except claims 2, 32, 62 and all claims dependent from these claims stand rejected under 35 USC 103 as being unpatentable over Marra '027 in view of Hanna et al. This rejection is traversed. The Examiner urges that Marra teaches a screen (pressure control plate 30) having different hole area per unit area in some portions than in other portions and other elements of the claimed bushings or methods, but does not teach the number of tips, a bushing having at least 24 cells formed between the screen and the tip plate or an internal support structure whose elements intersect and form angles with one another. However, the Examiner states that Hanna teaches bushings having these missing features and that it would have been obvious in the sense of 35 USC 103 to have combined the teachings of Marra and Hanna et al to obtain the claimed invention. This invention is traversed for the following reasons:

1) Combining the teachings of Marra with the teachings of Hanna et al does not produce the claimed invention, but rather leads one of ordinary skill away from the claimed invention. The teachings of Marra lead the skilled artisan to a bushing in which the end portions 24 of the pressure control plate 30 have a lower flow rate than than the center portion 15, see the paragraph spanning columns 3 and 4, Figure 4 and col. 4, lines 16-26. Also note, lines 30-34 of col. 4 where Marra states that the pressure control plate above chamber 28, the center portion of the pressure control plate 30 can be dispensed with. This and the teachings in Marra and in U.S. Pat. No. 4,488,891 incorporated into Marra to describe the parameters of a "dripless bushing" clearly show that Marra teaches a pressure control plate, screen, that is completely different in kind and result than the screen in the claimed invention.

2) Marra teaches the solution of a different problem with a different solution to obtain a different result (bushing/method) than the claimed invention. This is discussed in the present specification on page 3, lines 5-17. As shown in Marra in col. 1, lines 39-51 and 54-68 and in col. 2, lines 1-4, the problem dealt with by Marra are one or more of the disadvantages of the dripless bushing of 4,488,891, and the solution of Marra is to change the bushing to a hybrid bushing containing dripless sections and a non-dripless section with the dripless sections being at the ends of the bushing, and by doing so by varying the flow rate through the pressure control plate 30 such that the flow rate of molten glass into the dripless sections 40 is lower than the flow rate of molten glass into the non-dripless center portion 38. Also, Marra's objective is not to achieve a more uniform tip plate temperature, that will solve or greatly reduce the problem of fibers breaking out, especially in the corner portions and end portions of the tip plate, but instead Marra's solution is to prevent the breakouts that do occur in the end portions tip plate from breaking out the fiber array from the rest of the bushing and by doing so by preventing the tips having broken fibers in the dripless sections from "beading down", from forming beads heavy enough to break away from the tips which would cause a breakout of the entire bushing, see col. 1, lines 30-39 and lines 27-29, and also col. 1, lines 47-58 of 4,488,891 that describes how a bead drop can cause the array of fibers coming from a bushing to totally break out, causing costly interruption of the bushing fiberization. The result of the teachings of Marra is a bushing having a pressure control plate whose end portions have a lower flow rate, i.e. smaller hole area per screen unit area than the center portion. This is opposite of the claimed bushings. A reference that teaches addressing a different problem, the slow bead down time of a dripless bushing, with a completely different solution, adapting or slightly reducing the problem instead of solving or greatly reducing the problem, and getting a completely different result could not possibly have lead the skilled artisan to the claimed invention.

3) Nothing in Hanna et al would lead the skilled artisan to reverse the teachings of Marra,

For these reasons Applicants believe the present claims are patentable under 35 USC 103 over Marra in view of Hanna et al and respectfully requests the Examiner to withdraw this rejection and to allow all of the claims.

Claims 1-2, 31-32, and 61-62 stand provisionally rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1 and 3-4 of 7,194,875 and in view of Marra and Hanna et al. This rejection is traversed for the reasons given above in response to the rejection under 35USC103, Applicants do not believe that the claimed invention is made obvious by the teachings of Marra and Hanna et al. The teachings of Marra are so contrary to the problem addressed, a more uniform tip temperature, and the solution, a higher flow rate through the end portions of the screen than the center portion, that the teachings of Marra would not lead the skilled artisan to combine the teachings of 7,194,875 with Hanna et al to obtain the claimed invention – note that 7,194,875 does not teach placing the screen on or very close to the internal supports of the tip plate, and Marra teaches isolating sections 40 only to achieve a low flow rate, dripless operation in the end portions of the bushing compared to the center portion of the bushing, an opposite result of the invention claimed here. Thus one of ordinary skill in the bushing art would not be led to the claimed invention by Marra. Note that neither 7,194,875 nor Hanna et al teach supporting the screen in the manner of the claimed invention and that Marra states that the partitions (apparently 36) extend from the discharge wall (tip plate) to the pressure control plate 30 and does not say that they are welded or otherwise attached to either, i.e. Marra does not teach or reasonably suggest that the partitions are internal supports for the tip plate.

Applicants further contend that this rejection is an improper hindsight rejection using applicants present specification as a "road map" or "template" to find references the Examiner believes teaches the various parts of the claimed invention and then improperly combining those references to obtain the invention even though one of ordinary skill in the art would not arrive at the claimed invention from the reasonable teachings of those references. For these reasons applicants believe that the claimed invention is not properly subject to an obviousness-type double patenting rejection and respectfully requests the Examiner to withdraw this rejection and to allow all of the claims.

Applicant's attorney believes that the amended claims and arguments above address all of the Examiner's reasons for rejection and that the claims are now in condition for allowance. If the Examiner believes that still further changes are needed, applicant's attorney invites a telephone interview to expedite the disposal of this application.

Respectfully submitted,


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